Serial Number _____

MODEL 4020LT, 4021L AND 4001L CORROSOMETER® TRANSMITTER & RECEIVER USER MANUAL CE

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Chapter 1
Introduction

The Model 4020LT is an intrinsically safe two-wire CORROSOMETER® Transmitter designed to be directly connected to a plant Distributed Control System (DCS). The 4020LT Transmitter may also be utilized in plants that do not have a DCS system by combining it with a Rohrback Cosasco Systems Model 4021L CORROSOMETER Receiver, to become a stand-alone, single-channel instrument system Model 4001L.

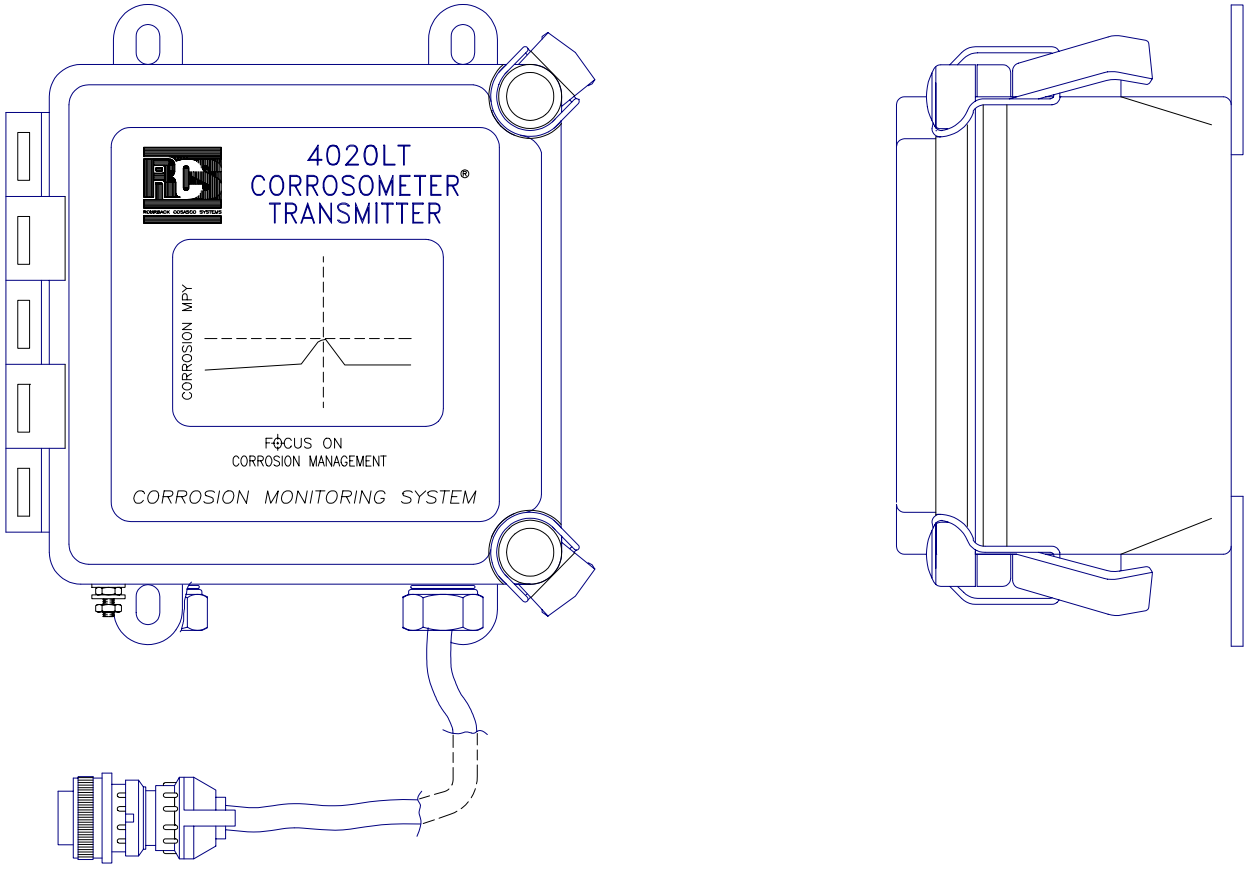

Figure 1.1 4020LT Transmitter Unit

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The Model 4020LT is easily field mounted and readily applied to the measurement of corrosivity in most process applications. Most wire loop, tube, strip or all welded CORROSOMETER probes may be used with the Model 4020LT Transmitter.

WARNING!The Model 4020LT transmitter is not suitable for use with CORROTEMP CORROSOMETER Probes

The 4020LT is attached to the probe using the integral five foot extension cable. A single twisted pair cable connects the Transmitter to a standard 4-20mA current loop. The Transmitter controls loop current as a function of metal loss, beginning at 4mA, and ending at 20mA when the CORROSOMETER probe sensing element has been fully corroded.

> ***NOTE:*** *The check element of the CORROSOMETER probe is not utilized with Model 4020LT.*
>
> The general system configurations that may be used are indicated in Figure 1.2.

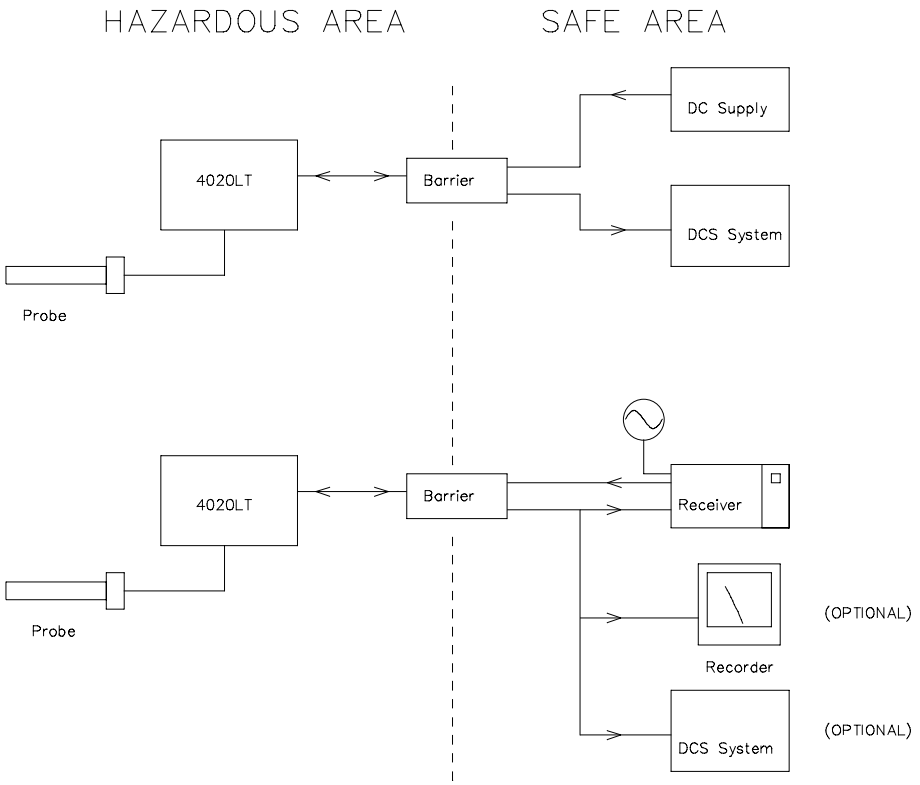

Figure 1.2 System Configuration Options

The Model 4020LT is compatible with any Rohrback Cosasco CORROSOMETER probe type, but is furnished specifically for each of the three basic probe types from the factory. The compatibility is listed in Figure 1.3. It is not field convertible from one type to another.

Transmitter Suffix	Probe Type	Element Type Applicable
-W-	A	W40, W45, W60, W80
-TS-	B/C	S4, S8, S10, S20, S40, S60, T4, T8
-SP-	D	T10, T20, T50

Figure 1.3 Instrument Type/Probe Type Compatibility

The Model 4021L Receiver is a line powered display unit which provides a 24VDC supply to power the instrument loop, and provides a readout of metal loss or corrosion rate calculated over the last 48 hours. This system layout is shown in fig. 1.2. The metal loss or corrosion rate display is selectable on the front panel switch.

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Chapter 2
Specification

Transmitter Model 4021LT

- Enclosure NEMA 4X, IP66
- Weight 5 lbs (2.3 Kg)
- Dimensions 6.50"H x 8.00"W x 4.25"D (165mm x 203mm x 108mm)
- Probe Cable Length 5ft. Standard 50ft. Maximum
- Intrinsic Safety rated for USA, Canada, and Europe.

  For probe element **OR** transmitter in Class 1 Division 1, or Zone 0 / Zone 1, hazardous area (requires safety barrier):

  For USA and Canada: Ex ia TEMP CODE T4 Class 1, Division 1 Groups ABC and D when installed in accordance with drawing 081036

  For Europe: EEx ia IIC T4 Tamb = -20°C to +60°C
  When installed in accordance with drawing 081036.
  DEMKO 03 ATEX 0307577X

  For both probe element **AND** transmitter in Class 1 Division 2 or Zone 2 (safety barrier not required):

  For USA and Canada: Class 1, Division 2 groups ABC and D with or without safety barrier with supply maximum voltage of 32 VDC and maximum current 25 mA

- RFI meets European standard IEC 1000-4-3, Test Level 3 over extended frequency range of 20-1000 MHZ
- Supply Voltage Range 14-32 VDC at 20 mA
- Output 4-20 mA into maximum safe area load of 600 ohms with safety barrier
- Resolution ± 0.4%
- Ambient Temperature Range -18°C (0°F) to +60°C (140°F)

Receiver Model 4021L

- Panel Mounting
- Weight 2 lbs (0.9 kg)
- Dimensions 2" x 5.23" x 9.5" (51mm x 133mm x 240mm)
- Panel cut out 2" x 4.3" (51mm x 109mm)
- Power Supply 115VAC or 240VAC as ordered 50/60Hz

Chapter 3
Installation

Unpacking

Check that the package contains the following items:

- Model 4020LT Transmitter
- 4021L Receiver (with 4001L System)
- Test probe attached to probe cable
- Instruction Manual

NOTE: *All 4020LT system components are carefully tested, inspected and packaged prior to shipment. Before unpacking the instruments, please inspect the packaged materials for shipping damage and retain damaged materials to support any claim against the freight carrier should this become necessary.*

Before Installation

Installation of the 4020LT consists of three separate tasks:

- Mechanical mounting
- Electrical wiring
- Zero (i.e. 4mA) Calibration Check

Before proceeding with the installation, several items must be considered. Make sure the Model 4020LT has the correct Rohrback Cosasco Systems type probe connector and the correct transmitter for the probe type you are using (See table in Chapter 1 for confirmation).

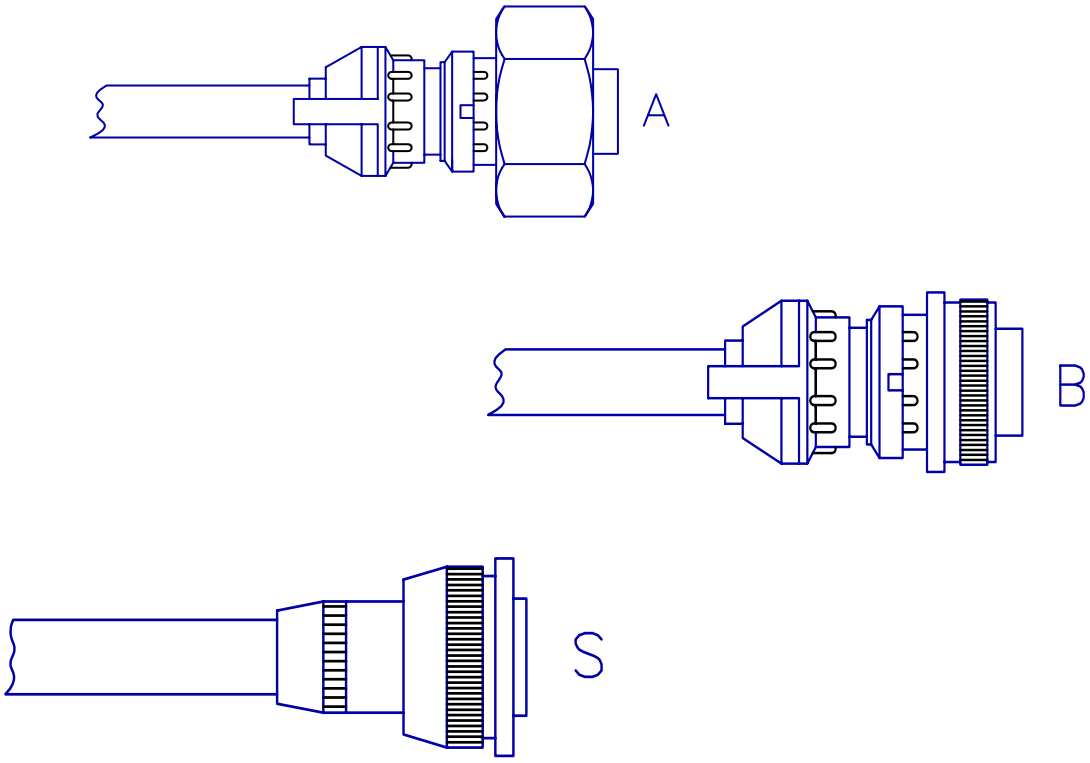

Figure 3.1 Types of Cable Connectors and Probes

The transmitter should be mounted close enough to the probe to allow the use of the 60-inch extension cable supplied. For mounting of the transmitter or probe in a hazardous area the correct safety barrier and instructions of the intrinsic safety certification must be followed.

NOTE: *Transmitters are available with longer cables up to a maximum of 50 ft. However, for the best signal to noise performance the cable should be kept as short as practical.*

Mechanical Mounting of Transmitter

The Model 4020LT Transmitter should be located within 48 inches of the CORROSOMETER® probe to be monitored. The integral extension cable is 60 inches long, but it is preferable to allow a service loop of approximately 12 inches to the probe.

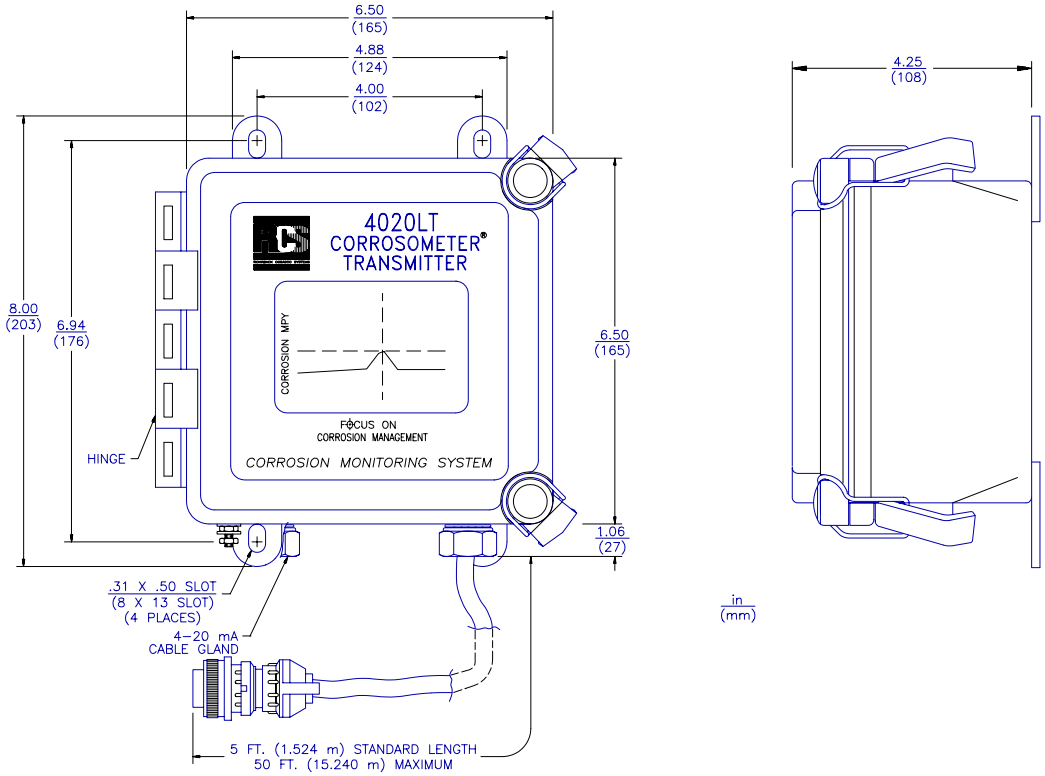

Figure 3.2 Mounting Dimensions

Figure 3.2 shows the dimensions and physical layout of the transmitter.

Electrical Wiring of Transmitter

If both the probe and transmitter are located in a non-electrically hazardous area, the transmitter may be connected as any other typical two wire transmitter.

A DC supply of typically 24 VDC is required to power the 4-20mA loop. The transmitter requires between 14 and 32 VDC at the transmitter for correct operation.

NOTE: *If the environment for both the probe element in the process stream,* ***AND*** *the transmitter are classified as Class 1, Division 2 or Zone 2 the transmitter may be used without a safety barrier (see intrinsic safety certifications). If either probe element* ***OR*** *transmitter are in a Class 1, Division 1 or Zone 0 / Zone 1 a safety barrier must be used.*

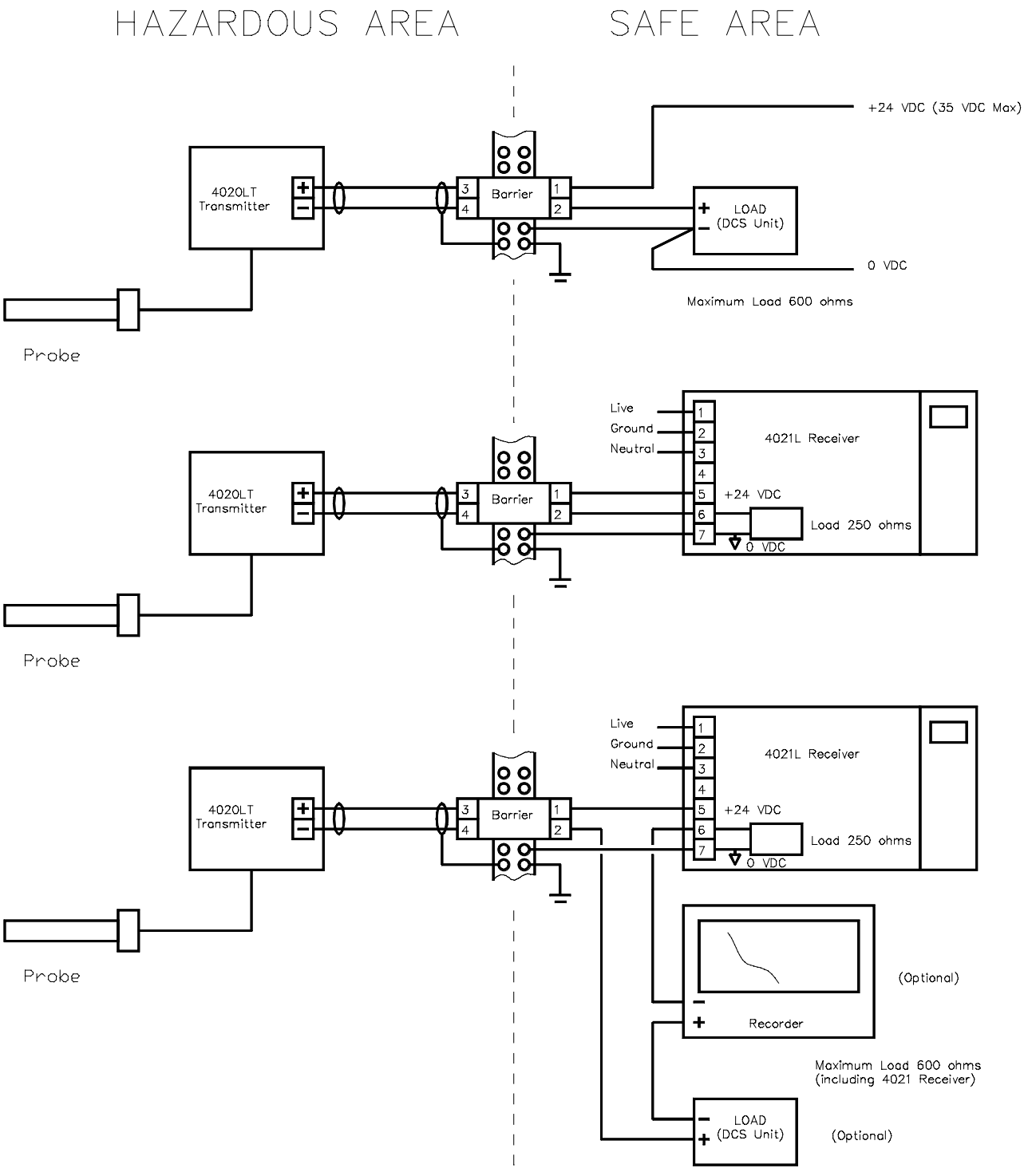

Figure 3.3 Wiring Configurations With Safety Barriers

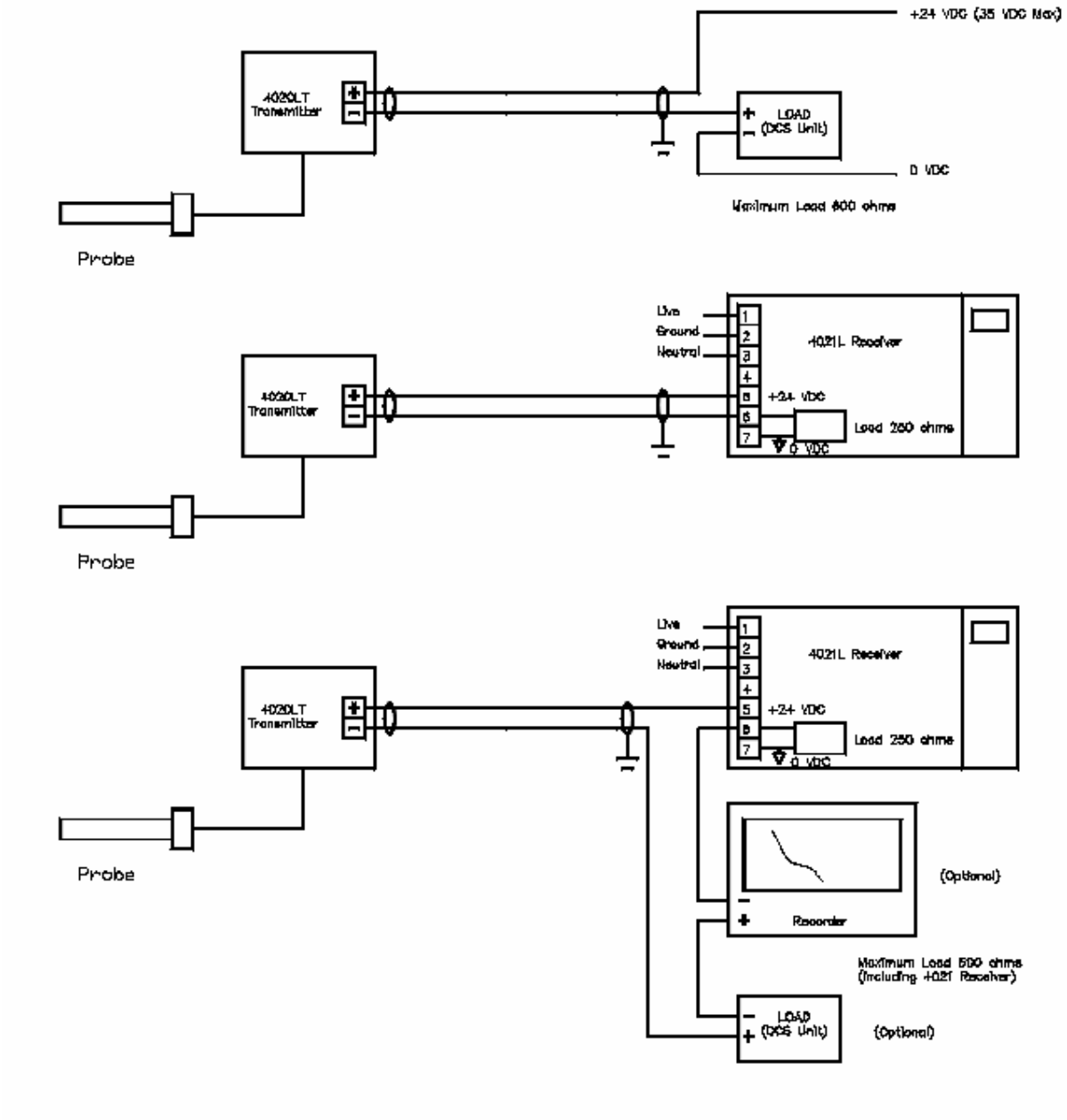

Figure 3.4 Wiring Configurations Without Safety Barriers

Zero Calibration Check

For location of the switch to check the zero calibration (4.0 mA) of the transmitter see Figure 3.5.

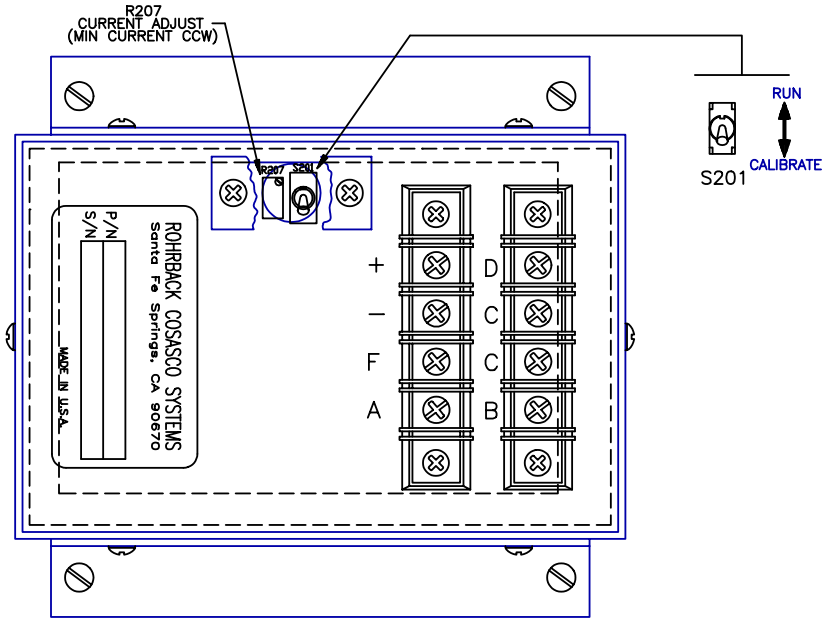

Figure 3.5 Location of Zero Calibration Switch

Normally, this zero calibration may be omitted since any slight zero shift is of little consequence since it is the change in metal loss that is important, which is not affected by the starting value. However, if the zero is thought to be significantly off the correct value, proceed as follows.

Temporarily remove the plus lead from the 4-20mA loop connections to the transmitter. Install a suitable current meter, observing meter polarity between the wire and the plus terminal. Set the calibrate switch to the calibrate position. Power up the loop current source and observe the current meter. Adjust R207 on the Transmitter board and adjust for 4mA of indicated current (ccw is the minimum current).

Power down the loop current source, and return the switch to the run position. When the calibrate switch is returned to the run position (and loop current is on) it will take up to a maximum of three minutes for the Transmitter output current to settle to its probe driven value. Remove the current meter and reconnect the plus current loop lead to the plus terminal of the 4-20mA loop connectors.

The current loop may be energized and the 4020LT CORROSOMETER® is now on line.

It is unnecessary to "range" the current loop from 4-20mA during calibration, and there are no user adjustments for this purpose. It is only necessary to set the 4mA value with this type of CORROSOMETER system. However, there is supplied with the transmitter a test probe that provides an upscale reading that is primarily intended as a “go-nogo” test for the instrument to check between an instrument problem and a probe problem (see Chapter 5 - Maintenance). The value printed on the test probe in mA may be used to check the loop current and the equivalent displayed output in the DCS system or on the 4021 Receiver.

4021L Receiver Unit

When the system is used with the Model 4021L receiver (designated Model 4001L as a complete system) the receiver unit provides the 24VDC to power the loop and provides a panel display of metal loss or corrosion rate based on the last 48 hours of data.

The system connection details are shown in figure 3.4. Normally the system is supplied with the Model 4021L receiver unit set to ranges corresponding to the probe with which it will be used. This will be indicated on the outside of the unit. If this ranging needs to be hanged, remove the side panel and reset the DIP switches as indicated in the table below.

WARNING! Take particular note that as these switches are designated by element thickness NOT element span. Example: a W40 probe has 40 mil thickness for this setting purpose, although its span is 10 mils.

The DIP switch settings are as follows:

Probe Thickness (mils)	Element	DIP Switches □ Off ■ On							
		1	2	3	4	5	6	7	8
0.25		□	□	□	□				
0.5		■	□	□	□				
1		□	■	□	□				
2		■	■	□	□				
4	S4*,T4	□	□	■	□				
5		■	□	■	□				
8	S8*,T8	□	■	■	□				
10	S10*,T10	■	■	■	□				
20	S20*,T20	□	□	□	■				
30		■	□	□	■				
40	S40*,W40	□	■	□	■				
45	W45	■	■	□	■				
50	T50	□	□	■	■				
60		■	□	■	■				
80	W80	□	■	■	■				
100		■	■	■	■				
Probe Type						5	6		
Wire (A)						■	□		
Tube Loop / Flush (B)						□	□		
Strip Loop ©						■	■		
Cylindrical (D)						□	■		
Display Units								7	8
Micrometers									□
mils									■
Rate / Metal Loss								■	
Penetration								□	

Figure 3.6 Receiver DIP Switch Settings

Chapter 4
Operation

The output from a model 4020LT transmitter is a 4-20mA signal that corresponds linearly to the range of zero to the probe span.

WARNING! ***This linear output is different from the earlier model 4020 transmitter, which had a non-linear characteristic. If using the 4020LT to replace a model 4020 the conversion formula for the corrosion data must be modified.***

Metal Loss From 4-20mA Signal

To convert the 4-20mA signal into metal loss the conversion formula is as follows:

$$Metal\ Loss\ in\ mils = \frac{\{I_L - 4\}}{16} * Probe\ Span\ (mils)$$

$$Metal\ Loss\ in\ mm = \frac{\{I_L - 4\}}{16} * Probe\ Span\ (mils) * 0.0254$$

$$Metal\ loss\ in\ \mu m = \frac{\{I_L - 4\}}{16} * Probe\ Span\ (mils) * 25.4$$

It is advisable to record the metal loss typically every five minutes and generate a graph of metal loss against time. Visual display of the data is very useful to check general trends and the significance of any signal noise. It is also helpful in determining the filter factor for the corrosion rate algorithm as detailed in the next section.

Corrosion Rate Calculation

The Model 4021L receiver unit operates on a simplified algorithm that calculates corrosion rate every 6 hours. The rate is computed from the metal loss change over the previous 48 hours.

For Distributed Control Systems (DCS) we recommend a corrosion rate algorithm based on linear regression (the best straight line), with an adjustable filter factor. The adjustable filter factor is obtained by varying the number (or time period) of readings (m in the formula) over which the liner regression is applied. Readings are best taken every five minutes. The time period over which the data should be computed is 1 to 5 days, with the ability to adjust this, preferably on an individual probe channel basis.

$$Slope = Corrosion\ rate = \frac{\sum y_i (x_i - \mu)}{\sum (x_i - \mu)^2} \qquad (1)$$

where,

$$\mu = \frac{\sum x_i}{m} \qquad (2)$$

and,

y = value of metal loss numbers, corresponding to x time base values

x = the time base values

m = the number of points used for the regression

Depending on the units chosen for x and y, the corrosion rate may need to be converted to the rate units required.

As an example if y is in units of mils, as determined from the formula in the Metal Loss from 4-20 mA signal section, and $\times$ is in units of days from some nominal origin. Using a time base of 3 days of data for calculation of rate (i.e. 3 x 24 x 12 = 864 data points) the corrosion rate from equations (1) and (2) would be in units of mils/day. This could normally be converted to mils/year by multiplying by 365.

In setting up the algorithm the time period of 3 days in the example should be adjustable from 1 to 5 days to provide filtering as necessary to minimize noise yet give adequate sensitivity to upsets. The shorter the time period, the more sensitive but noisier will be the rate calculation. The longer the time period, the less sensitive but quieter will be the rate calculation.

Probe Spans

The following table indicates the probe spans for the various probe types available.

CORROSOMETER PROBE ELEMENT	TYPE	SPAN		
		mils	mm	μm
Strip Loop S4	C	1.0	0.025	25
Flush Element S4* Atmospheric Element S4* Strip Loop S8 Tube Loop T4	B D C B	2.0	0.051	51
Flush Element S8* Atmospheric Element S8* Tube Loop T8	B D B	4.0	0.102	102
Flush Element S10* Cylindrical Element T10	B D	5.0	0.127	127
Flush Element S20* Cylindrical Element T20 Wire Loop Element W40	B D A	10.0	0.254	254
Wire Loop Element W45	A	11.25	0.285	286
Flush Element S40* Wire Loop Element W80	B A	20.0	0.508	508
Cylindrical Element T50	D	25.0	0.635	635

Figure 4.1 CORROSOMETER Probe Types and Spans

When using the Model 4021L receiver unit the probe thickness rather than probe span must be set with DIP switches (see section on 4021L Receiver Unit in Chapter 3).

Chapter 5
Maintenance

The Model 4020LT Transmitter should require little maintenance. Normal probe replacement is required in order to maintain continuous corrosion monitoring at a site. All probes have a certain life based on their geometry and amount of corrosion they are exposed to. A probe replacement schedule should be established with a criterion such as 7/8 of probe life (875 span divisions) to time change out.

As a reminder, proper probe selection should be based on closely matching probe span to mpy corrosion rate for optimum instrument accuracy.

During probe replacement, all connections, such as the connectors at the probe, should be environmentally protected and checked for good electrical conduction. Under normal conditions the Transmitter should not require recalibration when replacing identical probes. It is recommended as a good procedure that the current loop power source be powered down during probe change out.

<u>WARNING!</u> For reasons of maintaining the intrinsic safety certifications it is important that any repairs be carried out by RCS or its authorized agent to maintain the certification of the instrument.

The Model 4021L Receiver requires no maintenance. If a problem is suspected with the probe or transmitter, use the test probe provided with the transmitter to test the loop. The test probe is marked with the loop current in mA that this should provide in the 4-20 mA loop. This signal may be converted to check the display on the receiver if applicable.

$$Metal\ loss\ display = \left(\frac{Test\ probe\ mA - 4}{16}\right) x\ Probe\ SPAN\ (mils)$$

Appendix A
CORROSOMETER Theory

CORROSOMETER Systems are based on the electrical resistance method of corrosion monitoring pioneered by Rohrback in the 1950's and 1960's. CORROSOMETER probes are basically "electrical coupons." They determine the loss of metal from the probe by measuring the change in its resistance. Because of the very low resistances involved, very sensitive monitoring circuits are used in CORROSOMETER instruments to measure the change in probe resistance compared to a protected reference element resistance series-connected to the corroding measurement element. A "check" element is also included and is protected from the process along with the reference element. The ratio of check to reference resistance should remain constant. If it doesn't, this indicates that degradation of the reference element may be occurring and that metal loss readings obtained from the probe are questionable. A simplified diagram of a typical electrical resistance monitoring circuit is shown in Figure 1.

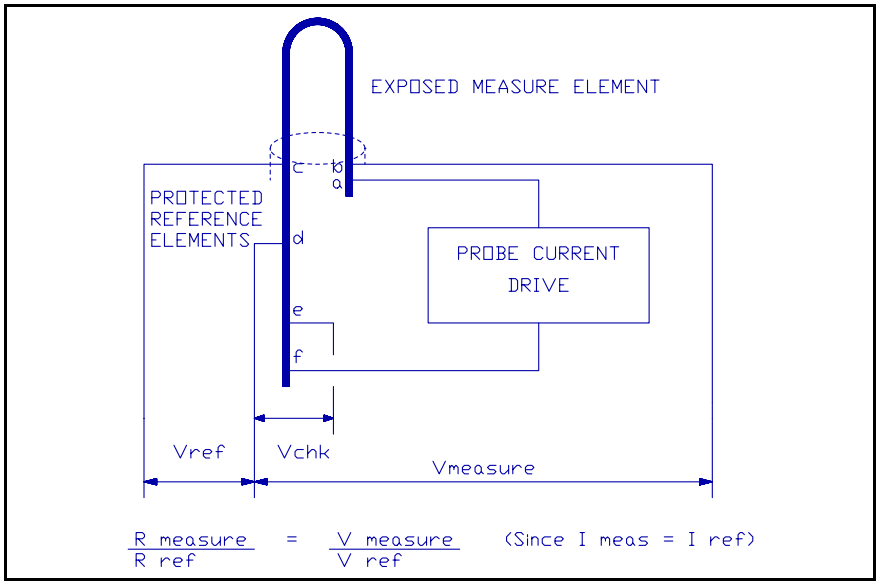

FIGURE 1

As with coupons, CORROSOMETER probes must be allowed to corrode for a period of time before accurate corrosion rate measurements can be made. The actual length of time required depends upon the corrosion rate--the higher the rate, the shorter the time required, and vice-versa. CORROSOMETER probes are available in a variety of styles and with useful probe life ("span") ranging from 2-25 mils, in styles commonly used in process piping systems. Instrumentation to measure electrical resistance probes divides the probe span into l000 "divisions." A probe with a 2 mil span is therefore theoretically capable of measuring thickness changes of 0.002 mils. In practice, however, we recommend that a change in indicated metal loss of l0 divisions be required before the data is used to calculate corrosion rate. Indications of an upward or downward trend can be obtained with as little as a 4-division change, but care must be exercised in interpreting such small changes because other factors (e.g. temperature changes) can also be responsible. The actual time required to produce meaningful corrosion rate information with common probe spans at different corrosion rates is shown in Figure 2 and summarized in Table 1.

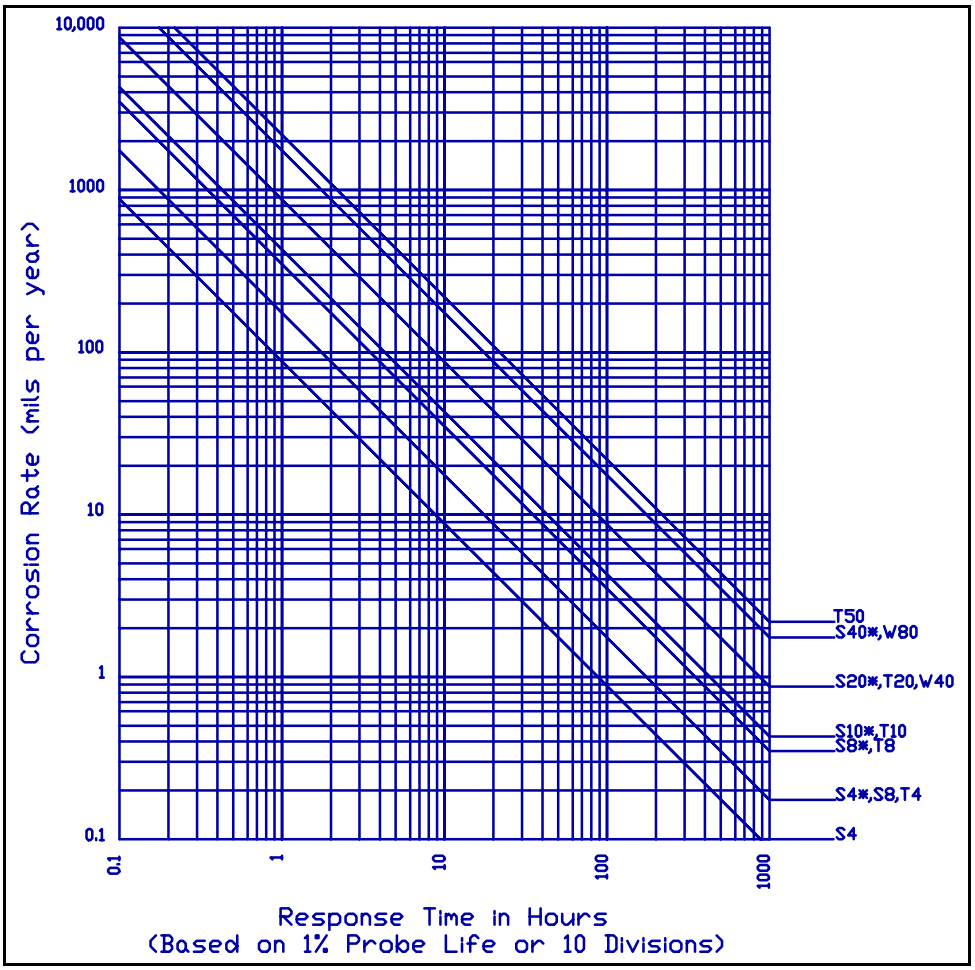

FIGURE 2

Corrosion Rate (mpy)	Probe Span (mils)					
	2	4	5	10	20	25
0.1	73 days	5 months	6 months	12 months	24 months	30 months
0.5	15 days	29 days	37 days	73 days	5 months	6 months
1.0	7 days	15 days	18 days	36 days	73 days	3 months
5.0	35 hours	3 days	4 days	7 days	15 days	18 days
10	18 hours	35 hours	2 days	4 days	7 days	9 days
25	7 hours	14 hours	18 hours	35 hours	3 days	4 days
50	4 hours	7 hours	9 hours	18 hours	35 hours	2 days
75	140 mins	5 hours	6 hours	12 hours	23 hours	29 hours
100	105 mins	4 hours	5 hours	9 hours	18 hours	22 hours

TABLE 1

Elapsed Time* To:			Corrosion Rate* with 10 mil Span Probe
Early Trend Indication (4 Div.)	Meaningful Rate Data (10 Div.)	End of Useful Probe Life (1000 Div.)	
1.6 hours	4.0 hours	17 days	220 mpy (5.6 mm/y)
4.0 hours	10.0 hours	1.4 months	88 mpy (2.2 mm/y)
9.6 hours	1 day	3.3 months	37 mpy (0.94 mm/y)
18.0 hours	1.8 days	6.0 months	20 mpy (0.51 mm/y)
1.1 days	2.7 days	9.0 months	13 mpy (0.33 mm/y)
1.5 days	3.7 days	12.0 months	10 mpy (0.25 mm/y)
1.8 days	4.6 days	15.0 months	8 mpy (0.20 mm/y)
2.2 days	5.5 days	18.0 months	6.7 mpy (0.17 mm/y)
2.9 days	7.3 days	24.0 months	5 mpy (0.13 mm/y)

* All data shown to two significant digits only.

TABLE 2

From Table 1, it would appear desirable to always choose probes with the lowest span

available in order to get the greatest sensitivity. However, the more sensitive the probe, the faster the entire probe span will corrode away and require a new probe to be installed.
Table 2 illustrates this relationship.

It is our experience that the objectives of most monitoring programs can be achieved cost-efficiently by selecting CORROSOMETER probes which will reach the end of their useful life in 6 - 9 months at the expected corrosion rate. Unlike a monthly coupon replacement program, this electrical resistance probe will continuously produce data that verifies that the average corrosion rate over the previous 2-3 days is still at the originally-expected (design) rate. If the corrosion rate increases to twice the design rate, meaningful data to permit the new rate to be calculated will be available in a day and a half. Conversely, if the actual corrosion rate is below design, a longer period is required before meaningful data are available to calculate the new rate.

CORROSOMETER probe elements are available in a variety of styles. A selection of the available styles is shown in Figure 3. Wire, tube, and strip-loop styles all have a loop of metal exposed to the process. The loop protrudes from the end of the probe body through either a hermetic glass seal or a Teflon/ceramic, Teflon/epoxy or epoxy seal/packing system. Choice of materials is dependent upon stream composition, process conditions and performance requirements. Cylindrical elements utilize specially-made, thin-wall tubing as the measurement element. Cylindrical probes are generally "all-metal;" i.e., there is no other material exposed to the process. There are, however, also some cylindrical probes available which join the probe body at a hermetic glass seal. A variety of flush-mounted probes are also available; so-called because the measuring element is mounted parallel to the flow stream, flush with the inside pipe wall.

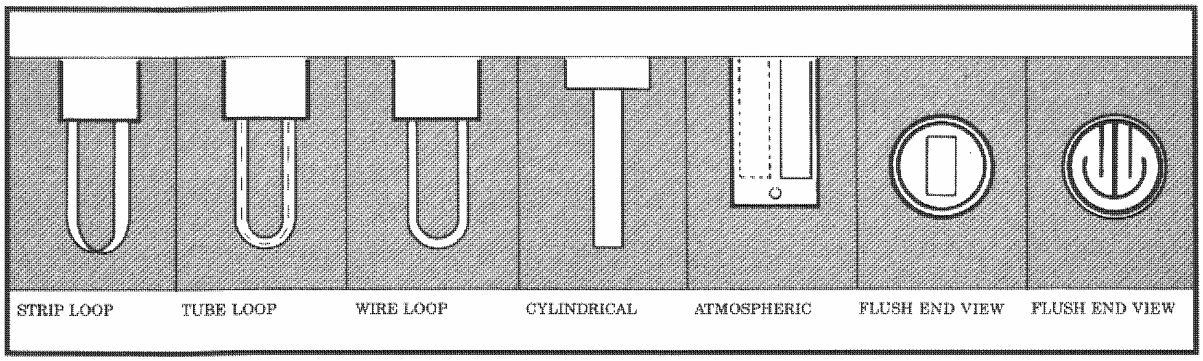

FIGURE 3

CORROSOMETER monitoring systems can be applied to all processes. However, some types of CORROSOMETER probes are better suited to the requirements of particular applications than others.

Different styles of CORROSOMETER probes are affected to different degrees by pitting attack. Figure 4 shows the results of pitting attack on a wire loop probe. Although the remaining wire thickness shows that only 30% or so of the probe span has been consumed, the probe is obviously out of service. Cylindrical elements on the other hand, are affected to a much lesser degree by pitting because of the much larger circumference of the measuring element. Wire loop and tube loop elements also have a tendency to be electrically shorted by a bridge of iron sulfide corrosion product. This is especially prevalent in low-velocity streams over an extended period. The effect of such bridging is to reduce the measured metal loss of the probe, creating a misleadingly low corrosion rate. Cylindrical probes demonstrate more resistance to iron-sulfide bridging due to their construction and lower inherent resistance per unit length, thus minimizing the effect of the shunt resistance. Where pitting or substantial Fe_xS_y deposition are expected to be problems, cylindrical probes should be chosen wherever possible over loop-style probes.

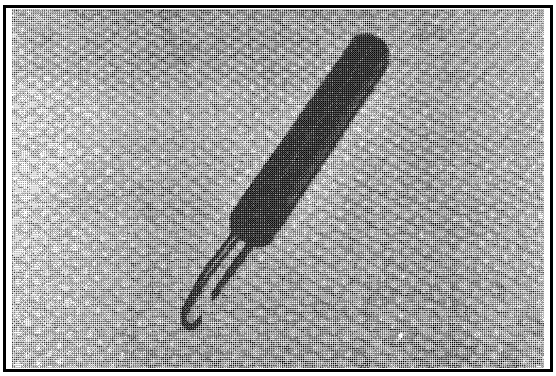

FIGURE 4

Most cylindrical probes are of all-welded construction in order to eliminate the need for sealing metal elements to non-metallic glass, epoxy or ceramic. This all-welded construction gives the probe superior resistance to leaking. Probes with higher temperature ratings can also be constructed in the all-welded style. A drawback to the all-welded style is that the element is electrically connected to the pipe wall which can, in certain conditions, interfere with the corrosion reaction on the probe. Also, because cylindrical probes are welded, in some conditions preferential corrosion can occur in the heat-affected zones near the weld.

Flush probe elements are thin, flat metal sections embedded in epoxy or a hermetic

glass seal inside a metal probe body. Flush probes also experience certain characteristic problems, most notably: lack of adhesion of the metal element to the epoxy, cracking of glass seals due to differential expansion and erosion of the epoxy or glass due to high velocities, abrasive materials in the flowstream or both. Flush CORROSOMETER probes mounted on the bottom of the line have been shown to provide good results in a sour gas gathering system.

Because the measurement element is part of the primary pressure seal, and because it's designed to corrode, CORROSOMETER probes have a reduced resistance to leaking after prolonged exposure. Once the measurement element has corroded through, the internals of the probe body are exposed to the process fluid. Although materials are chosen in part for their strength and lack of permeability, it is our experience that process fluids will permeate throughout the probe packing material. For this reason, quality probes are constructed of corrosion-resistant body materials and include a secondary pressure seal, often consisting of a hermetic glass-sealed connector. Other back-up seals are utilized in special cases, especially where process fluids will attack glass (e.g. hydrofluoric acid service). Please contact the factory if you have any questions about the compatibility of probe materials with your application.

The reference and check elements are protected from the process to which the measurement element is directly exposed. Temperature changes in the process will, therefore, affect the measure element before the reference and check elements. Because of the very low resistances involved, these changes can significantly affect the metal loss readings. CORROSOMETER probes incorporate special design features to minimize the thermal resistance of the materials insulating the reference and check elements from the process. It should also be noted that cylindrical probes are inherently better able to react to temperature changes due to location of the reference and check elements concentrically inside the measure element.

Appendix B
Requirements for Intrinsic Safety Operation

To meet the requirements of the certifying authorities for the intrinsic safety certifications under which the equipment is operated, it is important that the requirements of the certifications documents and installation practices are followed. The following certification documents provide this information.

<u>WARNING!</u>The transmitter has certifications for use with and without a safety barrier. In general, the process stream into which the CORROSOMETER probe is installed will determine if a safety barrier is required. If this process stream is classified as Class 1 Division 1, or Zone 0 or Zone 1 by the jurisdiction of the applicable authority, then a safety barrier MUST BE USED. Alternatively, if the process stream is classified as Class 1 Division 2, or Zone 2, then the safety barrier NEED NOT BE USED.

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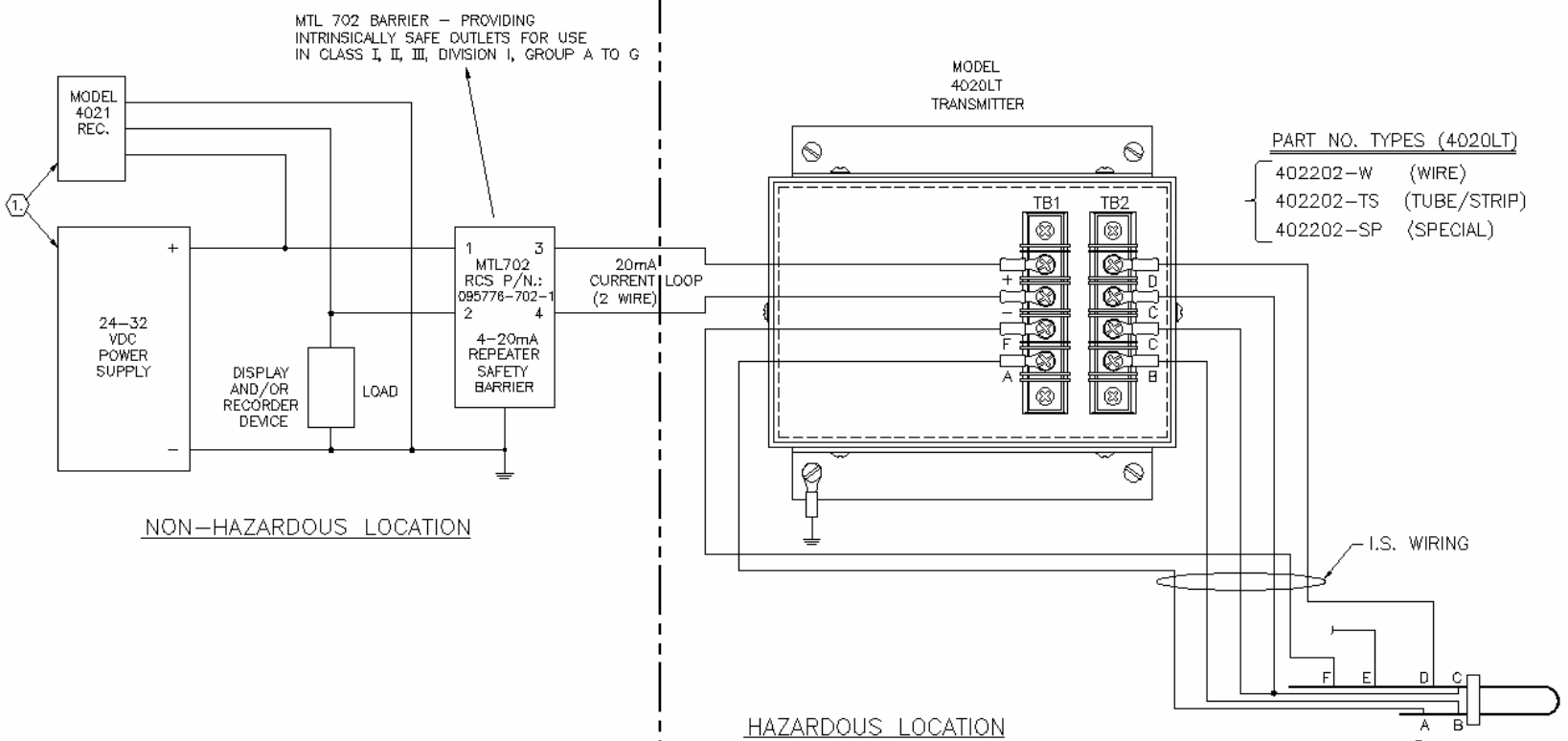
REVISIONS					
REV	ECN	DESCRIPTION	BY	APPD	DATE
–	7623	INITIAL RELEASE	T.LAM	S.S.	14.OCT.94
A	8113	UPDATED PER UL	R.E.P.	S.S.	26.MAY.95
B	12016	UPDATED PER DEMKO	R.E.P.	S.S.	07.OCT.03



PART NO. TYPES (4020LT)

- 402202–W (WIRE)
- 402202–TS (TUBE/STRIP)
- 402202–SP (SPECIAL)

CORROSOMETER® PROBE TYPES: WIRE, TUBE/STRIP, OR SPECIAL

5. RESISTANCE BETWEEN EARTH GROUND OF BARRIER AND EARTH GROUND OF FEEDER SUPPLY MUST BE LESS THAN ONE OHM.
4. EARTH GROUND OF BARRIER MUST BE CONNECTED TO EARTH GROUND OF THE FEEDER SUPPLY CIRCUIT.
3. I.S. WIRING MUST BE INSTALLED IN ACCORDANCE WITH ARTICLE 504 OF THE NATIONAL ELECTRICAL CODE ANSI/NFPA 70.
2. MAXIMUM LENGTH OF I.S. WIRING = 50 FT.
1. TYPICAL HOOKUP – ROHRBACK MODEL 4021 RECEIVER OR INDEPENDENT POWER SUPPLY AND RECORDER MAY BE USED.

NOTES: UNLESS OTHERWISE SPECIFIED:

SAFETY CRITICAL COMPONENT

NO CHANGES OR DEVIATIONS WITHOUT THE PERMISSION OF THE DIRECTOR OF Q.A. AND THE CERTIFYING AUTHORITIES FOR THE FOLLOWING CERTIFICATIONS:

UL–E62616
DEMKO 03 ATEX 0307577X

WARNING: SUBSTITUTION OF COMPONENTS MAY VOID APPROVAL.

UNLESS OTHERWISE SPECIFIED: TOLERANCES .XX ±.02 .XXX ±.015 ANGLES ±0°30' SURFACE ROUGHNESS PER ANSI B46.1 63

DRAWN T. LAM 12.OCT.94
CHKD AL KELLER 13.OCT.94
ENGR SL STRICKLIN 14.OCT.94
CUSTOMER
CONTROL DOCUMENTS
NEXT ASSY | TOP ASSY
APPLICATION
HEAT TREAT | FINISH | MATERIAL

ROHRBACK COSASCO SYSTEMS
SANTA FE SPRINGS, CALIFORNIA USA

TITLE: MODEL 4020LT TRANSMITTER INSTALLATION BLOCK DIAGRAM

SIZE C | DWG. NO. 081036
SCALE NONE | DO NOT SCALE DRAWING | SHEET 1 OF 1

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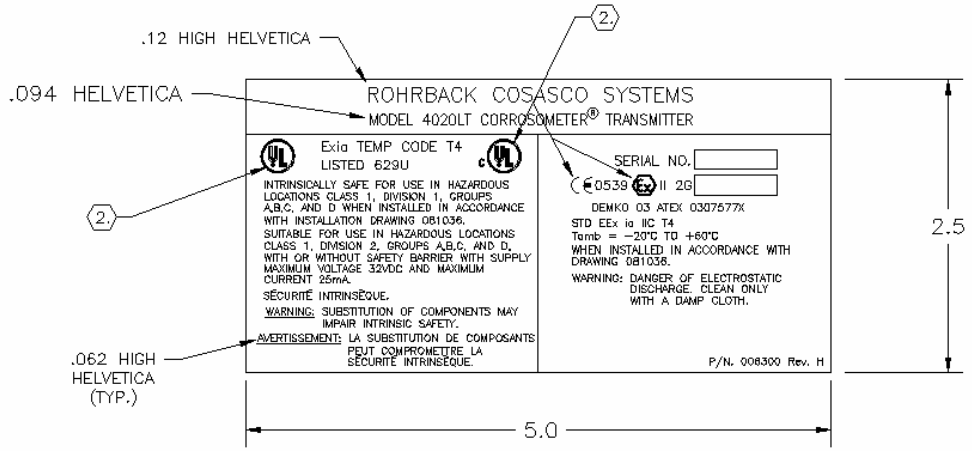
REVISIONS					
REV	ECN	DESCRIPTION	BY	APPD	DATE
–	8062	INITIAL RELEASE	R.E.P.	S.L.S.	05.MAY.95
A	8113	UPDATED PER UL	R.E.P.	S.L.S.	25.MAY.95
B	8136	ADDED AMBIENT TEMP.RANGE TO LABEL	T.H.L.	S.L.S.	09.JUN.95
C	8181	REVISED LABEL PER KEMA REQ.	S.L.S.	J.M.K.	13.JUL.95
D	8223	CORRECTED TEXT, ADDED P/N & REV.	T.H.L.	S.L.S.	14.AUG.95
E	9179	ADDED 'LISTED 629U' PER UL REQD.	T.H.L.	S.L.S.	19.AUG.97
F	11879	UPDATED NAMEPLATE, ADDED DEMKO ATEX #	T.H.L.	S.L.S.	06.JUN.03
G	12007	UPDATED PER DEMKO	R.E.P.	S.L.S.	03.OCT.03
H	12037	CHGD PER DEMKO	R.E.P.	R.M.S.	22.OCT.03


.12 HIGH HELVETICA
.094 HELVETICA
2.
2.
.062 HIGH HELVETICA (TYP.)
ROHRBACK COSASCO SYSTEMS
MODEL 4020LT CORROSOMETER® TRANSMITTER
Exia TEMP CODE T4
LISTED 629U
INTRINSICALLY SAFE FOR USE IN HAZARDOUS LOCATIONS CLASS 1, DIVISION 1, GROUPS A,B,C, AND D WHEN INSTALLED IN ACCORDANCE WITH INSTALLATION DRAWING 081036.
SUITABLE FOR USE IN HAZARDOUS LOCATIONS CLASS 1, DIVISION 2, GROUPS A,B,C, AND D, WITH OR WITHOUT SAFETY BARRIER WITH SUPPLY MAXIMUM VOLTAGE 32VDC AND MAXIMUM CURRENT 25mA.
SÉCURITÉ INTRINSÈQUE.
WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
AVERTISSEMENT: LA SUBSTITUTION DE COMPOSANTS PEUT COMPROMETTRE LA SÉCURITÉ INTRINSÈQUE.
SERIAL NO.
0539 II 2G
DEMKO 03 ATEX 0307577X
STD EEx ia IIC T4
Tamb = –20°C TO +60°C
WHEN INSTALLED IN ACCORDANCE WITH DRAWING 081038.
WARNING: DANGER OF ELECTROSTATIC DISCHARGE. CLEAN ONLY WITH A DAMP CLOTH.
P/N. 006300 Rev. H
2.5
5.0

SAEFTY CRITICAL COMPONENT

NO CHANGES OR DEVIATIONS WITHOUT THE PERMISSION OF THE DIRECTOR OF Q.A. AND THE CERTIFYING AUTHORITIES FOR THE FOLLOWING CERTIFICATIONS:

UL–E62616
DEMKO 03 ATEX 0307577X

3. CENTER JUSTIFY TEXT ON LABEL.

2. LOGO'S SHOWN ARE APPROXIMATIONS. RCS WILL SUPPLY ACTUAL CERTIFICATE LOGO ARTWORK.

1. ALL CHARACTERS TO BE BLACK.

NOTES: UNLESS OTHERWISE SPECIFIED:

402202	402202
402029	402029
NEXT ASSY	TOP ASSY
APPLICATION	
HEAT TREAT	

UNLESS OTHERWISE SPECIFIED:
TOLERANCES
.XX .XXX ANGLES
±.02 ± – ± –
SURFACE ROUGHNESS PER ANSI B46.1

FINISH: MATTE FINISH INTENSIFY WITH GOLD CHLORIDE SOLUTION 3M 467 ADHESIVE –40 – 400°F

DRAWN: R. PARKER DATE: 05.MAY.95
CHECK: AL KELLER DATE: 05.MAY.95
ENGR: S.L. STRICKLIN DATE: 05.MAY.95
CUSTOMER
CONTROL DOCUMENTS

MATERIAL: 8–12 MIL THICK 1100 – H18 ALUMINUM 5% MAGNESIUM MAX BY WEIGHT

ROHRBACK COSASCO SYSTEMS
SANTA FE SPRINGS, CALIFORNIA USA

TITLE: LABEL, INTRINSICALLY SAFE – MODEL 4020LT UL–DEMKO ATEX

SIZE: B DWG. NO. 006300
SCALE: 1=1 DO NOT SCALE DRAWING SHEET 1 OF 1

[1]
[2]

EC-TYPE EXAMINATION CERTIFICATE

Equipment or Protective System intended for use in Potentially explosive atmospheres Directive 94/9/EC

[3] EC-Type Examination Certificate Number: **DEMKO 03 ATEX 0307577X**

[4] Equipment or Protective System: **4020 LT Transmitter**

[5] Manufacturer: **Rohrback Cosasco Systems Inc**

[6] Address: **11841 E Smith Ave, Santa Fe Springs CA 90670 USA**

[7] This equipment or protective system and any acceptable variation there to is specified in the schedule to this certificate and the documents therein referred to.

[8] UL International Demko A/S, notified body number 0539 in accordance with Article 9 of the Council Directive 94/9/EC of 23 March 1994, certifies that this equipment or protective system has been found to comply with the Essential Health and Safety Requirements relating to design and construction of equipment and protective systems intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in confidential report no: **03NK07577**

[9] Compliance with the Essential Health and Safety Requirements has been assured by compliance with:

EN 50014:1997 E incl. A1 + A2 EN 50020:2002 E

[10] If the sign "**X**" is placed after the certificate number, it indicates that the equipment or protective system is subject to special conditions for safe use specified in the schedule to this certificate.

[11] This EC-Type examination certificate relates only to the design, examination and tests of the specified equipment or protective system in accordance to the Directive 94/9/EC. Further requirements of this Directive apply to the manufacturing process and supply of this equipment or protective system. These are not covered by the certificate.

[12] The marking of the equipment or protective system shall include the following:

Ex II 2G EEx ia IIC T4

On behalf of UL International Demko A/S

Herlev, 2004-01-20

Karina Christiansen
Certification Manager

UL International Demko A/S
Lyskaer 8, P.O. Box 514
DK-2730 Herlev, Denmark
Telephone: +45 44856565
Fax: +45 44856500

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[13]

Schedule

[14]

EC-TYPE EXAMINATION CERTIFICATE No.

DEMKO 03 ATEX 0307577X

[15] Description of Equipment or protective system:

The Model 4020LT is designed to measure and transmit information on corrosive gasses in metal pipes. The device consists of a transmitter unit and a probe. Several types of probes may be used with the device.

Types comprised by the certificate:

Model 4020LT Transmitter

Electrical data:

Supply: Ui: 25,11V Ii: 125 mA Pi: 0,78W

Temperature data:

$-20°C \leq Ta \leq 60°C$

[16] Report No.:

Project Report No.:03NK007577 (Hazardous Location Testing)

UL International Demko A/S
Lyskaer 8, P.O. Box 514
DK-2730 Herlev, Denmark
Telephone: +45 44856565
Fax: +45 44856500

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Drawings Number	Rev	Sheet	Date	Description
402202	G	1	7-Oct-03	Top Assy, 4020LT
006300	H	1	22-Oct-03	Label, Demko
402204	H	1	22-Oct-03	Enclosure Sub-Assy
402048	C	1	26-Sep-03	Schematic
402210	G	1	7-Oct-03	PCB Bracket Sub-Assy
402221	H	1	25-Sep-03	PCB Assy, Power Board
402047	E	5	30-Apr-03	PCB, Power Board
094248	H	1	7-Oct-03	Transformer, Potted Diodes (T201)
094257	A	1	7-Oct-03	Transformer, Probe Drive (T201)
402005	R	1	25-Sep-03	PCB Assy, Signal Board
402007	J	1	25-Sep-03	PCB Mechanical Detail
094247	G	1	7-Oct-03	Transformer, Potted Diodes (T101, T102)
994228	A	1	7-Oct-03	Transformer, Input, Matched Pair (T101, T102
044054	S	1	23-Oct-03	Test Probe
402228	J	1	23-Oct-03	Cable std
402229	E	1	23-Oct-03	Cable Flex

The manufacturer shall inform the notified body concerning all modifications to the technical documentation as described in ANNEX III to Directive 94/9/EC of the European Parliament and the Council of 23 March 1994.

[17] Special conditions for safe use:

The Transmitter has a plastic enclosure and static charges are dealth with by the marking "wipe with a damp cloth".

[18] Essential Health and Safety Requirements

Concerning ESR this Schedule verifies compliance with the Ex standards only. The manufacturer's Declaration of Conformity declares compliance with other relevant Directives.

On behalf of UL International Demko A/S Herlev, 2004-01-20

Karina Christiansen
Certification Manager

UL International Demko A/S
Lyskaer 8, P.O. Box 514
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Appendix C

Manufacturer's Declaration of Conformity

We the manufacturer hereby declare that this product:

PRODUCT NAME: Loop Powered CORROSOMETER Transmitter
MODEL: "4020LT"

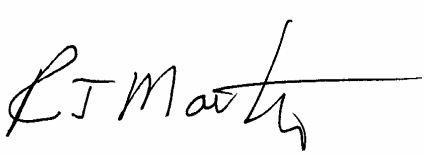
is in full compliance with all applicable EU Product Directives and required standards as noted below:

EMC DIRECTIVE 89/336/EEC
PRODUCT STANDARDS:
EN55022:1994

Radiated Emissions - EN 55011:1991, Group 1, Class A

Immunity (Heavy Industrial) - EN 50082-2: 1995
Electrosatatic Discharge - EN 61000-4-2: 1995
Radiated EM Field - ENV 50140: 1994
Electrical Fast Transient - EN 61000-4-4 :1995
Conducted Immunity - ENV 50141 :1993

PLACE AND DATE OF ISSUE: **April 9, 1997**
Rohrback Cosasco Systems
Santa Fe Springs, California USA



AUTHORIZED SIGNATURE: _____
Ronald J. Martinez
Director of Quality Assurance